ACTION
Agenda Item H

ENGINEERING EDUCATION

March 20, 2000

Recommendation:

- That the Bachelor of Science in Construction Engineering and Management, Electrical Engineering, and Mechanical Engineering proposed by Western Kentucky University not be approved at this time.

- That the University of Kentucky, the University of Louisville, Western Kentucky University, and Council staff, in consultation with the other comprehensive universities and the KCTCS, design an alternative proposal to expand engineering education in Kentucky for consideration by the Council on Postsecondary Education at the earliest possible time, but no later than November 2000.

Background:

Kentucky needs more engineers. According to the Kentucky Science and Technology 1999 Entrepreneurial Capacity Report, the Commonwealth ranks 47th in the number of scientists and engineers per capita, and 45th in science and engineering graduate students per capita.

The University of Kentucky and the University of Louisville are not conferring enough baccalaureate degrees in engineering to meet the current demands of Kentucky employers. According to the American Association of Engineering Societies, Kentucky produces bachelor's degree holders in engineering at 43 percent of the national average, adjusted for size of population. Many Kentucky employers assert that there is a critical shortage of engineers in the Commonwealth and that they are having difficulty filling engineering positions.

Governor Paul Patton's and Speaker Jody Richards' "Knowledge Based Economy Initiative" will increase the need for engineers in Kentucky. This initiative envisions a Kentucky of the 21st Century that can successfully compete in the technology-driven global economy. This vision will require a dramatic expansion in Kentucky's capacity to produce citizens with highly developed skills in engineering, science, and technology.

Western Kentucky University's Response to the Need for More Engineers:

Western Kentucky University has studied the need for more engineers in south central Kentucky. Their analysis supports the need for more engineers there and across the Commonwealth. They have proposed three bachelor's programs in engineering as a response.

The creation of new engineering programs at Western and at other comprehensive universities is one alternative for producing more engineers for Kentucky. But this approach is not likely one that Kentucky can afford.

Western intends to fund the program without additional direct state support—a laudable goal—but state funds would be crucial to the program. Using the endowment match trust fund, the state contributed $1 million of the $2.5 million Western has raised to launch the program. The program's facilities depend upon the $15 million for space renovation at Western proposed by the Council in the postsecondary education budget. Continuation of the science building renovation and replacement project in 2002 also will be at state expense. Even then, it is not clear that the new and renovated space will be sufficient to support both existing science programs and the proposed engineering programs. Western has indicated that general fund dollars will be internally reallocated to support ongoing operations of the proposed programs.

The Council staff does not believe that Western has the faculty, space, and equipment to establish a stand-alone engineering program, especially given Western's determination to begin these programs in fall 2000. Among the most significant concerns are:

- Faculty - Western proposes to hire eight new faculty members (out of twelve total faculty). This faculty complement will meet only the minimum requirements of the Accreditation Board for Engineering and Technology (ABET) for teaching a basic curriculum in the proposed disciplines. It is unclear whether a basic curriculum with minimum staffing will allow Western students the range of options within each engineering discipline that today's economy requires. The ABET-accredited programs at Western's benchmarks (at Mankato State University, Southern Illinois University at Edwardsville, and the University of South Alabama) each have substantially more faculty than Western proposes.

- Facility - Western intends to house the proposed engineering programs in the renovated Thompson Science Complex space. At the earliest, this space will be available two years after the program's proposed start-date.

- Equipment - Western is raising private dollars to fund initial equipment upgrades. Western will then fund the estimated annual maintenance costs through a $2,000,000 endowment, of which it still needs to raise $1,500,000.

- Students – Demand for Western's current engineering technology degree programs is low, with five-year averages for annual degrees conferred below or just over the Council's threshold for academic program productivity. There is also substantial discrepancy between the number of Western students who enroll in engineering technology programs and those who graduate with degrees in the field. It is unclear whether low demand for engineering technology programs will translate into high demand for engineering programs. It is also unclear whether all or most engineering technology students would be eligible for enrollment in the proposed engineering programs.

While stand-alone programs at Western and other comprehensive institutions may not be the most appropriate and cost-effective response, the administration and faculty of Western have done Kentucky a service by focusing attention on this important issue. And Western should play an active role in meeting Kentucky's long-term engineering needs.

Alternative Response to the Need for More Engineers:

The Council on Postsecondary Education's current review of Kentucky's academic programs cautions against approving isolated solutions to complex problems until alternative statewide strategies are explored.

An alternative to the creation of multiple stand-alone programs in engineering at the comprehensive universities should take full advantage of and build effectively upon the resources Kentuckians have already invested in engineering at the University of Kentucky and the University of Louisville. Kentucky should also leverage the engineering technology, mathematics, and science programs at the comprehensive institutions. To meet the needs of employers and aspiring engineers, education and training should be made available at more than two, or even three, sites in Kentucky. The Accreditation Board for Engineering and Technology (ABET) explicitly encourages innovation through guidelines that provide broad discretion in approaches to delivering engineering education.

A statewide network of engineering education in Kentucky should reflect and improve upon existing models in other states (such as those involving Purdue University, Georgia Institute of Technology, and Virginia Polytechnic Institute and State University). As a next step, this recommendation proposes that representatives from UK, UofL, WKU, and Council staff, in consultation with the other comprehensive universities and the KCTCS, work together to design an alternative proposal to expand engineering education in Kentucky. In doing so, they should consider the following principles:

- UK and UofL as the only universities with the authority to confer degrees in professional engineering.
- Common curricula used at all participating institutions for the first and second years of study in each engineering discipline.
- Multiple options for completing upper division course work, including:
  - transfer to UK and UofL on-campus programs.
  - engineering education delivered locally at the comprehensive institutions by guest professors from UK and UofL, resident professors at the comprehensive universities, and distance learning courses offered by Kentucky institutions or other education providers.
- Opportunities for local business internships and "coops" available throughout the state and managed in partnership with participating comprehensive institutions.
- Cooperation among participating institutions to provide advising and other student services, including a statewide job placement service.
- Increases in minority and female recruitment to and graduation in engineering and related fields.

- The development of specializations among faculty at participating comprehensive institutions tailored to the needs of local industries and capable of being delivered statewide.

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